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COPY 2 OF 4

SUPPLEMENTAL PROGRESS STATEMENT NO. 22

NOVEMBER 9, 1955

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SUPPLEMENTAL PROGRESS STATEMENT NO. 22

NOVEMBER 9, 1955

This progress statement reports the status of Job 2381 as of October 15, 1955.

DECODER

1. New switch blades have been installed on the start limit switches. The new switch blades are designed to allow the resetting spring to push the start limit switch open with less force and assure that the code wheel is returned to its proper starting position after each reset action.

2. A retaining pin was installed to confine the helical reset spring to a smaller, more definite configuration. It was found that without a retaining pin some of the turns of the helix became bound to the shaft housing as the code wheel approached the end of code position. This resulted in a large increase in restoring force as the end position was approached.

ALERTING RECEIVER

1. Temperature tests and results.

(a) The first attempt at operation at +55°C showed that the increase in I_{co} in the second stage of the broadband amplifier was enough to decrease the collector potential to zero, resulting in a large loss in sensitivity. This stage is operated as a limiter and has a small collector voltage derived by inserting a by-passed dropping resistor in series with the collector supply. The value of this dropping resistor was

decreased and this difficulty removed. The output of this stage is now larger than desired at room temperature and below, and the waveform is asymmetrical, resulting in a fundamental component that is variable with signal level.

(b) Increase in current supplied by the AGC output as the temperature was increased caused the AGC circuit to have insufficient control of the output of the broadband amplifier at +55°C. The increased current was supplied to the AGC clipping diode and to the base of the controlled stage in the form of increased I_{co} current. The clipping diode was removed and a transistor with a floating emitter was connected between the +1.34 volt supply and the base of the AGC controlled transistor in such a manner that the transistor with the floating emitter is the source of I_{co} current for the AGC controlled transistor. The I_{co} current of both transistors varies in the same manner with temperature and the AGC output loading does not change appreciably with temperature. The circuit is shown in Fig. 1a.

(c) At -30°C, the output of the broadband amplifier was reduced and the output vs. input characteristic exhibited a peak at about -50 dbm input, a dip at -40 dbm, and then decreased at higher input levels. Distortion of the output of the broadband amplifier increased at high power levels. The output of the null stages, which select the fundamental component of the broadband amplifier output, decreased to a value insufficient to drive the output stages and operate the sensitive relays.

Examination of this problem indicates a necessity for better control of the waveforms and amplitude in the first two stages

of the broadband amplifier. It is planned to use limiting in the first stage as well as the second stage and to attempt I_{co} compensation similar to that described above, but introduced into the collector side of the transistor instead of into the base. See Fig. 1b.

(d) During the process of adjusting the null networks to the correct frequency and to have 20 db discrimination against off channel frequencies, considerable difficulty was encountered with oscillation of the null stages. Investigation of this problem revealed that in order to get 20 db of off channel discrimination, the null networks were being adjusted to give positive feedback at the null frequency. With this adjustment increases in the forward gain of the stage were causing oscillations. To correct this situation, the forward gain of the stage was increased by about 4 db and the null networks re-adjusted to have 20 db of off channel discrimination. The re-adjusted null networks then had negative feedback at the null frequency and hence changes in forward gain could not result in oscillations. The forward gain of the stage was increased by increasing the emitter current and removing the 20 K resistor across the primary of the output transformer. With this resistor removed, oscillations occurred at about 90 KC. A 300 μμf capacitor from the secondary of the output transformer back to the base of the transistor stopped this oscillation. These changes are indicated in Fig. 1c.

BATTERY BOXES

A check of the operation of the transistor power supply and transistor regulator at -27°C showed that neither of these circuits operated reliably at this temperature.

(a) The transistor power supply failed to start reliably. The primary winding of the feedback transformer was returned to the +30 volt supply instead of to ground. This results in a transient in this transformer when the +30 volts is applied which aids in starting the transistor power supply oscillator. This greatly improved the starting qualities of the oscillator but it still failed to start about five per-cent of the time. The turns ratio of the feedback transformer was then changed from 15 to 1 to 15 to 2. The oscillator then started every time for several hundred tests. The revised circuit is shown in Fig. 2. An additional change is being investigated which, if successful, would insure starting of the oscillator without the benefit of transients, such as would be the case if the supply voltage were brought up to +30 volts gradually.

(b) The transistor regulator also failed at -27°C. Since some changes were required, it was decided to change to what was considered a basically more sound circuit wherein the load is in the emitter circuit of the series regulating transistor. This requires that the series regulator be in the negative lead of the transistor power supply. An additional transistor is used to provide base current for the series regulating transistor to reduce the drain on the reference battery. The revised circuit is shown in Fig. 2.

(c) New batteries have arrived and new battery containers have been made. No cement will be used to hold the batteries together or to hold them in the containers. The batteries will be held in by plastic cover plates on the containers. This will allow individual replacement of faulty cells if necessary.

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Job 2381
November 9, 1955

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ENGINEERING SKETCH - NOT FOR PRODUCTION

TOLERANCES
UNLESS SPECIFIED WITH LIMITS DECIMAL DIMENSIONS MAY VARY +.005,—.005
FRACTIONAL DIMENSIONS MAY VARY +1/64,—1/64
DRILL, PUNCH, COMMERCIAL STOCK SIZES AND MANUFACTURERS TOLERANCES ARE NOT INCLUDED IN THE ABOVE.

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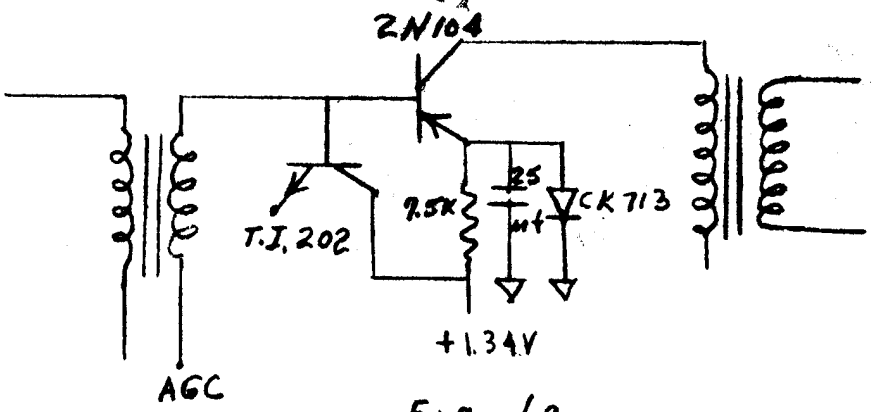

Fig 1.a

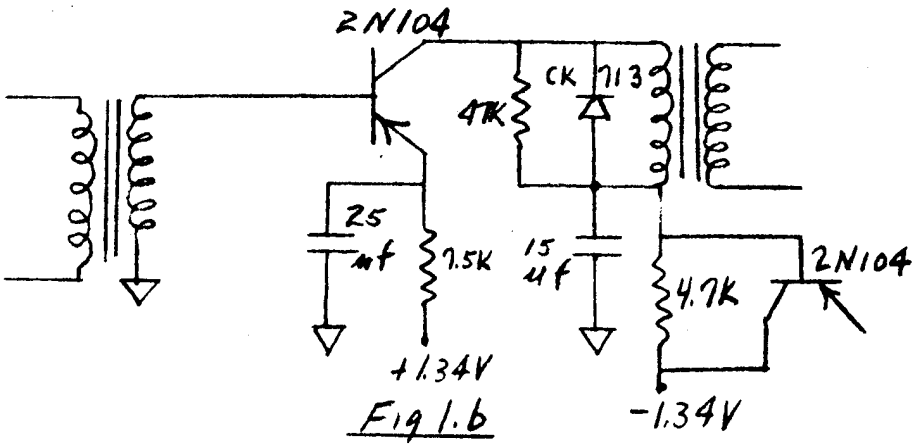

Fig 1.b

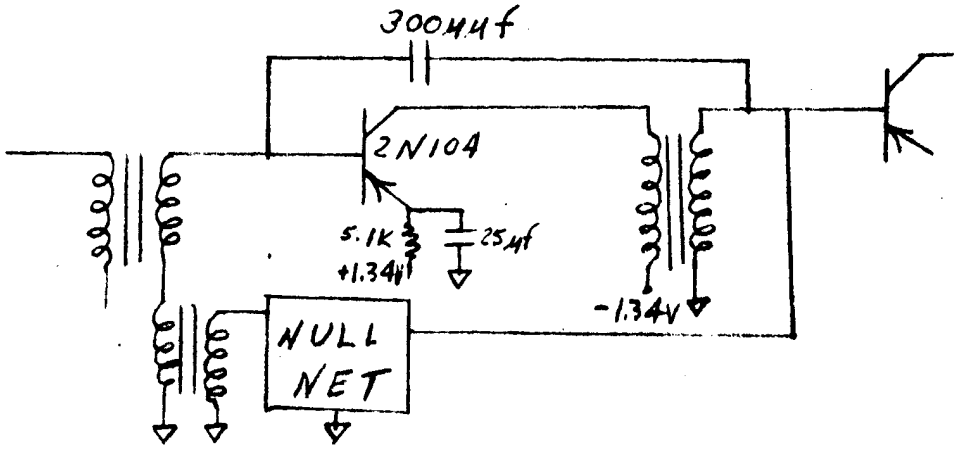

Fig 1c

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				MATERIAL / FINISH / DATE
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ENGINEERING SKETCH - NOT FOR PRODUCTION

TOLERANCES
UNLESS SPECIFIED WITH LIMITS DECIMAL DIMENSIONS MAY VARY +.005,—.005
FRACTIONAL DIMENSIONS MAY VARY +1/64,—1/64
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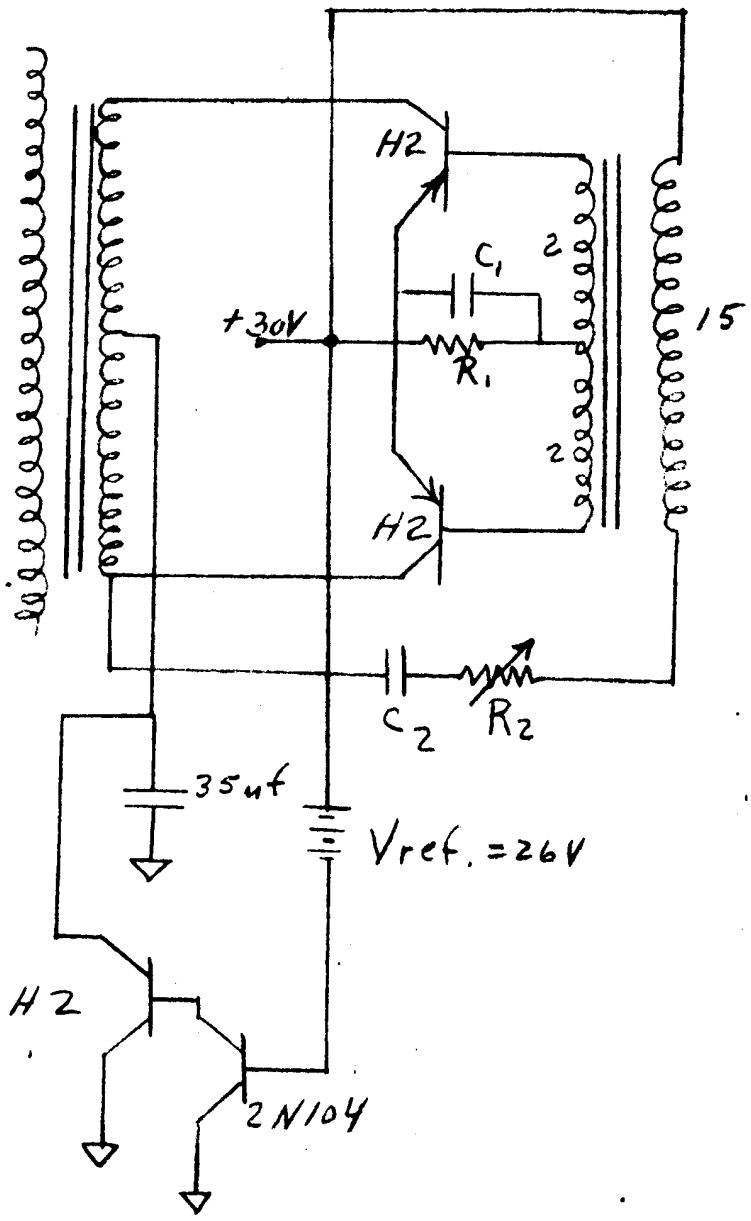

Fig. 2

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NEW YORK				FILE / CHECK'D / ENG.

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